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U. S. DEPARTMENT OF AGRICULTURE

REPORT OF THE CHIEF OF THE BUREAU OF HUMAN  
NUTRITION AND HOME ECONOMICS, AGRICULTURAL  
RESEARCH ADMINISTRATION, 1947

UNITED STATES DEPARTMENT OF AGRICULTURE,  
Washington, D. C., September 2, 1947.

DR. W. V. LAMBERT,  
*Agricultural Research Administrator.*

DEAR DR. LAMBERT: I submit herewith the report of the Bureau of Human Nutrition and Home Economics for the fiscal year ended June 30, 1947.

Sincerely,

HAZEL K. STIEBELING,  
*Chief.*

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The 32,000,000 homemakers of this country form the Nation's largest occupational group. In 1940 about 225 women were giving full time to homemaking for every 100 women and 300 men in the paid-labor force. Most of the working day of homemakers is spent in household buying and management, child care, the planning and preparation of meals, and the care of the house, its furnishings and household possessions.

Taken singly or as a group, homemakers have a big job with big responsibilities. Collectively, they spend billions of dollars each year for food, clothing, home furnishings, and the other goods and services that families use. When they buy intelligently, they help shape the markets for better farm and other products. When they manage time, energy, and goods efficiently, they help conserve the country's human and material resources. It has been estimated that full-time homemakers contributed 34 billion dollars' worth of unpaid service in 1945. This is a modest estimate, because despite their responsibilities for management and child guidance, the services of the farm and urban homemakers were valued merely at the rate of monthly earnings of farm workers and of city domestic workers, respectively.

How well homemakers succeed in all their responsibilities determines to a large extent the kind of living that the families in this country enjoy. The wide variety of their tasks and the responsibility involved emphasizes the need for broad education for homemaking. Women need the benefit of research directed to their problems, especially in these days of rapid scientific advancement and changing economic conditions. Through research the Bureau of Human Nutrition and Home Economics aims to develop facts needed to give the homemaker the kind of help with problems of everyday living that other branches of the Government give the farmer, the manufacturer, the merchant, and the wage earner.

The Bureau's research program includes the following types of work:

1. Studies of the nutritive contributions of different foods to the diet, the comparative cost of foods, the food and nutritional requirements of people, and how these facts can be applied by families in differing circumstances to the buying of food, the preparation of healthful meals, and the preservation and care of food in the home.

2. Studies of the comparative usefulness and cost of fabrics and garments that differ in material, construction, design, and finish. From these, specifications can be developed to provide products that can better meet consumer needs. This information can also be used to help consumers in their selection and care of fabrics, garments, and household textiles for various uses.

3. Studies of the housing and home-equipment needs of families for efficiency and comfort and the development of plans for rural houses, including adequate work and storage centers suited to meet the family's varied needs.

4. Studies basic to assisting families with the selection, care, and use of household equipment.

5. The collection and analysis of facts as to the quantities of different foods and other goods and services consumed by families in various regional and economic groups; the factors affecting their consumption; and an evaluation of its adequacy. These studies serve to indicate the potential market for household utilization of agricultural products. They help to clarify many of the management problems that families face and to point up issues for educators and other public leaders concerned with improving living.

This report summarizes some of the activities of the Bureau and the results of recent research, especially accomplishments of the last year.

### FAMILY BUDGETING PROBLEMS

The rapid upward trend in prices during recent months means that many families are having difficulties making ends meet, even though incomes and wage rates tend to be high compared with those of pre-war years. The need of individual families for budgeting assistance and the amount given is well attested by the volume of correspondence—letters from newly married couples, including veterans and their wives just setting up housekeeping, many trying to live on limited allowances, as well as from families no longer enjoying high wartime incomes. A publication on family financial planning is now being completed to assist extension workers and teachers in giving help to families asking for guidance.

Rapidly rising food costs during the past year brought an increasing number of requests to help families with low or medium incomes in managing food money. These requests came from agencies, and from families of differing size and composed of members of all ages. A revision was made of the National Food Guide to include quantitative

suggestions for each of the "Basic Seven" food groups as an aid in diet planning for wide and general use. A bulletin on food for the family with young children was added to a series being developed to aid different types of families. A "minimum-adequate" food budget for an elderly couple, prepared at the request of the Social Security Board, is another example of material developed to meet these food problems.

To help families improve their diets and get better returns in nutritive value for money and labor expended, the Bureau since 1930 has developed food plans at different cost levels. These food plans are revised from time to time to keep them in line with the latest scientific findings, current food supplies, and price relationships.

Food comes first among the money expenditures for living of farm as well as of village and city families. In a recent study in Tennessee that included both farm and rural nonfarm white families, food, clothing, and household operation—in that order—took the largest money outlay. The farm families spent an average of \$222 for food, \$176 for clothing, and \$82 for household operation. Nonfarm families spent \$635, \$274, and \$164, respectively, for these items. Thus, food comes first among the items that make claims on money income, even for farm families having much farm-furnished produce. The amount spent by farm families for food is, of course, greatly influenced by the amount of food home-grown and preserved for family use with little direct cash outlay.

#### EQUIPMENT FOR HOME CANNING

With the rapid rise in living costs, widespread interest in all methods of preservation of food at home continues. Questions on equipment are numerous. In recent years, manufacturers have put out steam pressure canners differing from prewar types in size, design, and materials. Questions have been raised as to whether the usual home-canning directions can be properly used with the varied styles of equipment. The Bureau has tested the effect of size, design, and material of steam pressure canners on the sterilizing values for foods in glass jars. It has been learned that while these factors do affect the operating characteristics of the canners somewhat, there are relatively small differences in the sterilizing values obtained when canners of various types are used to process specific foods. It is concluded that the processing times now recommended by the Bureau are safe when used with any of the canners studied.

To answer the many inquiries concerning the use of pressure saucepans for cooking and for canning small quantities of food, laboratory work has been started to determine some of the most important operating characteristics of pressure saucepans on the market. Since cooking and canning times are based on temperature, the temperatures inside pans during heating, venting, cooking, processing, and cooling have been determined. It has been found in a study of 11 types of saucepans that a 1-minute venting period is desirable to assure that pans will reach the required temperature. This is necessary for those on which gages indicate, but do not control, the pressure. In all cases when saucepans were not vented, the gages indicated operating pressure before proper temperature was actually reached—and unless the proper

temperature is reached satisfactory results with canning, or cooking, cannot be expected.

### CANNING, DRYING, AND FREEZING OF FOODS

Families ask for help on the best methods of preserving all kinds of foods—meats, poultry, vegetables, and fruit—in a variety of ways. Improvement of methods of canning chicken at home, so as to conserve more flavor and nutritive value, is being sought by the Bureau, in cooperation with the Bureau of Animal Industry. In one series of studies, young hens of the same age, breed, and history were prepared in different ways for the pressure canner. Some of this chicken was packed raw before canning; some was browned to various stages. After different periods of storage, samples were drawn from these experimentally canned packs and prepared two different ways for serving: by heating in the canning liquid and by frying. In general, young hens canned by the raw-pack method were judged superior in flavor to those fried before canning when the canned products were prepared for serving by heating in their own juice. Frying before canning produced an off-flavor in the canned product. This result was most pronounced in the chicken fried the longest. While these flavor defects were noticeable when the canned chicken was heated in its own juice and served, they were masked when the canned chicken was reheated by frying. The different methods of preparing the young hens for canning had little or no effect on juiciness or tenderness.

Old hens were likewise tested, and in this case the canned chicken was judged equal in quality regardless of the manner of preparation: Raw-packed, precooked in boiling water and water-packed, or browned before canning. Nor was any difference in quality detected when the canned chicken was prepared for serving two ways—by heating in its own juice and by frying. Observations of this canned chicken in storage have yielded few indications of lowered quality attributable to length of keeping.

To round out the program of research on home methods of canning poultry, meats, and low-acid vegetables, similar investigations are under way with fruits and tomatoes. Cooperative studies of the rate of heat penetration in these foods are being conducted both at the Massachusetts Agricultural Experiment Station and in the Bureau's Beltsville laboratories. A search for an appropriate spoilage organism for use in testing the adequacy of processing procedures for these acid foods is being continued both at the University of Texas and at Beltsville. Thus far none has been found that serves the purpose.

The Bureau's wartime research on home dehydration as a way of conserving food supplies has provided important help in meeting a postwar food situation abroad. One of the Bureau's food specialists went with a mission to Germany, which assisted scientists of that country to adapt the Bureau's methods of dehydrating foods to German household equipment, supplies, and fuel situations. A publication was prepared, and 875,000 copies were distributed during July and August 1947. Reports indicate that in these two months 120,000 tons

of surplus fruits and vegetables from the small gardens of Germany were conserved for winter use.

Methods of defrosting frozen foods, whether home or commercially processed, have been requested by many, since directions generally given differ widely. Experiments were undertaken to compare various ways of handling frozen products in preparation for cooking. For this purpose, commercial packs of frozen asparagus, broccoli, peas, and snap beans of known processing history were used. The methods tested included no thawing, thawing at room temperature for 3 to 4 hours, and thawing in refrigerated cabinets for 9 to 10 hours and for 33 to 34 hours. These different methods of handling were found to have no noticeable effects on palatability of asparagus or peas. Palatability of broccoli and snap beans was lower, however, when these vegetables were slowly thawed in the refrigerator for 33 to 34 hours than when they were handled by the other methods.

### NUTRITIVE VALUE OF FOOD

Knowledge of food values is basic for planning food needed by families, children at school, hospital patients, or armies. It is also necessary for estimating the nutritive value and adequacy of national food supplies and planning for the production and distribution of a nation's food. Values given in tables must be kept abreast of the progress of science.

A Bureau publication issued in 1945 in cooperation with the National Research Council provided representative values for 275 common foods, based on an evaluation of all the data then available from all sources, for protein, fat, carbohydrate, refuse, moisture, three minerals, and five vitamins. Supplementing these figures, data have now been assembled and evaluated to provide values on 34 additional food items as brought into the kitchen and on 26 cooked or prepared foods. Ratings of 72 fresh fruits and vegetables as excellent, good, or fair sources of vitamins and minerals have been published, as well as a table giving calorie values of common servings of more than 100 foods prepared for eating.

### AMINO ACID AND PROTEIN VALUES OF FOOD

During the year the Bureau's laboratory research has added to the fund of information on food values, especially about protein and vitamin A. New rapid and accurate methods for microbiological determination of three more of the nutritionally essential amino acids—methionine, lysine, threonine—were published. Methods have now been developed also for two others—valine and histidine. These methods have been applied to more than 30 important proteins and foods. That this research meets a need felt by scientists and teachers is indicated by the volume of requests for the published results, coming from hospitals, colleges, and other institutions in all parts of the world.

Recognizing that a number of food proteins are low in nutritive value because they have relatively little of the sulfur-containing amino acids, cystine and methionine, the Bureau is continuing investigations on the chemical and nutritive properties of these and other

amino acids containing sulfur, to learn more specifically their function in nutrition. A spectrophotometric method has been developed and is being used in learning the amount of cystine in a number of proteins. That the cystine and methionine content of eggs can be improved by changes in the protein of the hen's ration has been shown in research during the year in cooperation with the Bureau of Animal Industry. It has further been found, however, that feeding synthetic methionine to hens does not accomplish this result of raising the level of cystine or methionine in the eggs. Thus, it appears that methionine must be in combination with other linkages in the protein molecule in order to be usable in formation of egg protein.

A comparative study of the protein value of several major food grains as indicated by feeding experiments has been completed. Rolled oats were found to be equal or superior to all of the others tested, in both quality and quantity of protein. Rice, though lowest in quantity of its protein, ranked with oats as the highest in protein quality. Rye, whole wheat, barley, and corn followed in the order named in nutritional quality of protein. No significant difference in this respect was observed between hard spring and soft winter wheats.

Reports from various laboratories on the nutritive value of proteins in foods show numerous discrepancies, in some cases ascribed to the high temperatures that foods undergo in industrial processing. Continuing its work on the effect of heat on proteins, especially those in oilseeds, the Bureau has examined the biological value of the protein in an unheated cottonseed flour prepared at the Southern Regional Research Laboratory. This flour was a newly processed, solvent-extracted, gossypol-free product. Its protein was found to have a much higher nutritive value than that in commercial cottonseed flours studied earlier. This laboratory-produced cottonseed flour was found to contain an adequate amount of lysine, one of the amino acids essential to growth. This is of interest since some recent reports have pronounced cottonseed protein to be deficient in lysine. It may be that heat treatment changes the structure of the protein molecule, so that lysine is less readily liberated by digestive enzymes for the body's use. Work on this point is under way.

#### VITAMIN A VALUE OF VEGETABLES

Earlier research of the Bureau showed that both rats and people use cod-liver oil more efficiently than carotene as a source of vitamin A. Carrying forward its research to learn how well the carotene in different vegetables is utilized by the body, the Bureau has used such vegetables as kale and carrots in test diets. Experimental animals on diets otherwise adequate, and depending on the cooked vegetable for vitamin A, appeared to use only about 60 percent of the carotene in kale and about 25 percent of the carotene in carrots. The explanation appears to lie, in part, in the inability of the rat to free the carotene from the vegetable cells in the digestive tract. Earlier studies of the Bureau had indicated that human beings utilize the carotene from peas and spinach very well—better than pure carotene dissolved in oil. They do not, however, utilize the carotene from carrots so

effectively as that from peas or spinach. However, the richness of carrots in carotene makes it an outstanding source of vitamin A, despite incomplete utilization.

### CALORIE VALUE OF FOODS

Research into the fuel value of foods has received relatively little attention in recent decades in this country, as investigators opened up important fields of vitamin, mineral, and amino acid research. Consequences of World War II, with a need for a common international basis of calculating the physiological energy value of wheat and other foods, have renewed interest in the matter.

The Bureau has reviewed and summarized the literature on the derivation of calorie values from data on composition of foods, the heat of combustion of their major organic constituents, and their digestibility by man. The conclusion is that the conversion factors currently used in this country, the factors 4, 9, 4 developed by Atwater in 1899, can appropriately be applied to the total number of grams of protein, fat, and carbohydrate, respectively, when estimating the physiological energy value of our American diet as a whole.

A report prepared by the Bureau explains the changes needed in the present use of the Atwater system when more precise calculation of the calorie value of individual foods is needed. Applying this recommended procedure, the Bureau has developed new calorie values for wheat flours of three levels of extraction and tentative comparable figures urgently needed by the Army for a few other cereals, potatoes, and some additional groups of foods. The data on wheat also were requested and made available to the Cabinet Committee on World Food Programs in December 1946.

This survey brought out clearly the need for additional experimental work in order to develop more exact calorie values for many individual foods. Values in use are satisfactory for most practical purposes in this country, where calories are not a major diet problem, but not for international decisions regarding comparative levels of food consumption or food supplies. The Bureau will undertake co-operative research with State agencies to provide some of the fundamental data needed on individual foods.

### TEAMWORK AMONG FOODS

When diets consist of only a few foods and are composed largely of those that are cheap to produce, as are diets of many people in the world today, the question often is raised as to which supplemental foods, and in what amounts, are most helpful in improving nutrition. Earlier research in the Bureau showed that skim milk is an exceptionally good supplement for diets made up chiefly of bread with small amounts of fat, meat, potatoes, carrots, and kale. Without milk, growth was retarded, vitamin A metabolism disturbed, and deformities developed in the long bones of the leg. Further study was made to learn which nutrient or combination of nutrients in milk mainly accounts for the improvement. Three nutrients for which skim milk is important—riboflavin, calcium, and protein (casein)—

were fed separately and in combination as dietary supplements to laboratory animals, to note the effect on growth and bone development. Neither riboflavin nor calcium when added to the basal diet, alone or in combination, in amounts equal to that provided in milk, had any effect on growth. But when casein alone was added to the basal diet to bring the protein to the level that milk provided, the laboratory animals grew four to five times as fast as on the basal diet. Still more striking results followed when casein was combined with calcium—a growth rate nearly eight times that obtained with the basal diet. Including riboflavin had no effect on growth. When calcium was added to the diet, the bone developed normally, whether the calcium was given in inorganic form or as a constituent of milk or vegetable (kale).

### ELASTIC RECOVERY IN COTTON KNIT FABRICS

Greater use for American cotton may follow scientific research developing fundamental facts about structure and properties of yarns and fabrics in their relation to consumer use. Pioneering in one aspect of this basic research, the Bureau has studied the stress-strain properties of knitted fabrics of different composition and construction.

Since methods for measuring elastic recovery—recoverable stretch—had not been formulated, the Bureau first had to devise the necessary apparatus and procedure. From cyclic load-elongation curves, the stretch and recoverable stretch have been measured, and the elastic recovery calculated as the ratio of recoverable stretch to total stretch.

The method devised has been used in a study of 19 knitted fabrics. The fabrics were made of 40 and 64 courses per inch of yarns of cotton, wool, silk, linen, nylon, and of the three types of rayon. One point established is that elastic recovery of fabrics cannot be predicted from that of the yarns from which they were knit. For example, nylon yarn has greater elasticity than wool, but a fabric knit of nylon yarn does not recover as much as a similar wool material.

### FABRIC PROTECTION

Three methods devised by the Bureau for sterilizing wool without weakening the fibers appreciably or robbing the fabric of its soft, pliable quality have been given further comparative tests. The most promising of the procedures from a practical as well as bacteriological standpoint appears to be that of combining a chemical with moderate heat—0.6 percent sodium silicofluoride at 70° C. This method causes less change in breaking strength and color than use of steam under pressure. Also, it is quicker and less tedious than the method of using steam heat under pressure with the fabric immersed in a protective fluid (Stoddard solvent). The latter method requires the added process of ridding the fabric of solvent. Extending the application of the sterilizing methods to other fabrics subject to micro-organism attack, the Bureau has treated a fabric of manufactured protein fiber and rayon by the three methods, finding the same results as when wool and part-wool fabrics were treated.

During the year the Bureau has brought to a close a number of years of work on chemical finishes for prolonging the useful life of house-

hold and farm goods, such as awnings, shower curtains, porch furniture, tents, and seedbed covers. In the course of this work, approximately 250 finishing treatments considered of possible value were applied to unbleached cotton fabric. For one mildew-resistant finish, the Bureau was granted a public-service patent. This covers a process using morpholine with certain inorganic salts, especially those of cadmium and copper.

In the most recent experimental work, finishes which had been found to give mildew resistance to household fabrics were tested, in cooperation with other agencies of the Department, for their protective value to forest nursery seedbed and tobacco-bed covers. In these tests, protection against mildew and rot was given to forest seedbed covers by five treatments—using quercitron, osage orange, lead acetate with potassium dichromate, copper naphthenate with asphalt, copper ammonium naphthenate with asphalt-bentonite paste. After 3 years of use, fabrics treated with these finishes retained 75 percent of their original strength and proved twice as strong as untreated material similarly exposed. None of the mildew-resistant finishes, however, have eliminated the deterioration caused by weather and microbial rot in forest seedbeds.

The natural-dye treatments and those using lead acetate with potassium dichromate and copper salts applied with asphalt were found protective to tobacco-bed covers. After use for 2 years, fabrics treated with these finishes were 20 to 25 percent stronger than untreated controls.

Treatment of seedbed covers with cadmium chloride and soap was found to be toxic both to red oak seedlings and to tobacco plants.

Since termites cause fabric damage under the same climatic conditions that favor mildew, experiments have been made with the Bureau of Entomology and Plant Quarantine to develop finishes resistant to mildew and termites alike. The Bureau of Human Nutrition and Home Economics suggested for this use two natural dyes—quercitron and osage orange—which proved effective. These dyes can be applied with copper sulfate and potassium dichromate. Other finishes originated by the Bureau which have been found effective against termites include combinations of 8-hydroxy-quinoline with copper sulfate, mercuric chloride, and aluminum acetate. One finish, copper quinolate, is now produced commercially.

#### FUNCTIONAL CLOTHES FOR WOMEN AT WORK

Having pioneered in research to apply functional principles to women's work clothing, the Bureau continues to introduce improvements and add new designs to meet recognized needs. A group of summer housedresses and aprons, designed during the year, brings to 34 the number of work-garment designs released to the public.

In developing women's garments for specific jobs in industry, on the farm, or in household work the Bureau emphasizes the importance of understanding the job, interviewing workers, observing their activities and the circumstances surrounding their work. Underlying the special features of design that a specific job calls for are the principles which make a work garment for women truly functional.

From the research, the following are held to be basic: The garment is (1) simple in style, with no unnecessary features to hinder work or make the wearer conscious of her clothes; (2) easy-fitting—allowing free action but not so large as to be oversize; (3) comfortable for the prevailing temperatures where work is to be done; (4) safe, that is, without dangling ties or other features that might interfere with work and lead to injury; (5) convenient, with closings and fastenings planned for quick dressing and pockets placed for easy access; (6) time-saving and energy-saving, with style, construction, and material all planned for simple home sewing if the garment is made at home and for quick, easy care; (7) economical, requiring minimum expense consistent with the work needs; (8) attractive and becoming to women's figures; (9) durable, with materials and construction suited to the kind of wear and care that the garment will receive.

Loan exhibits of many of the functional work clothes designed and made in the Bureau's laboratories have been used by 48 States in the past year. The number of exhibits available could fill only half of the requests received.

#### FARM HOUSING

To help farm families in planning for comfort and efficiency when building a new house or remodeling an old one, a series of publications on planning, constructing, and equipping farmhouses has been begun in cooperation with the Bureau of Plant Industry, Soils, and Agricultural Engineering. Intended for families that must do much of their own planning and construction, these bulletins are being written in concise, readable style with a minimum of technical terms and a maximum use of illustrations. Three of the series have been completed, and several more are under way.

In one completed publication, practical guidance is given on how to plan remodeling. Experiences of an actual farm family in making its old home more comfortable and convenient, inside and out, are used to point up the principles of a sound planning job.

A second completed bulletin provides cut-outs to help in developing plans for remodeling, or for new farmhouse construction. Diagrams of standard pieces of equipment and furniture and structural features, such as closets and stairs, are provided, all drawn to scale. Also included are traffic diagrams showing step-saving arrangement of rooms—floor plans for each room in the house. These examples show good lay-outs and space needed for convenient placing of furniture and equipment.

A third publication, in press, deals with planning the bathroom. Usually the addition of a bathroom is one of the first considerations in farmhouse remodeling after the installation of electricity. Costly mistakes often occur when a bathroom is added to an old house. This bulletin gives practical suggestions on location of the bathroom, the selection and arrangement of fixtures, location of plumbing lines, provisions for storage, and selection of finishing materials.

The Bureau has also cooperated with the Bureau of Plant Industry, Soils, and Agricultural Engineering in developing new farmhouse plans for distribution through the Plan Exchange Service. This Service is cooperatively conducted by the Department of Agriculture

and the State agricultural colleges. From plans prepared by both, regional committees select the plans which most nearly meet regional needs. The State colleges make the working drawings and plans available to farmers. Of the 12 new plans developed by the Department and approved by the committees for use in the northeastern regional-plan exchange, working drawings for 5 have now been completed and are ready for distribution through the Plan Exchange Service. Twenty-five States have requested negatives of the working drawings in order to make blueprints to meet farmers' requests.

### FAMILY ECONOMICS

For many purposes, home economists want facts on the kind and amounts of goods and services families use, and how such use is affected by income, prices, and the size and composition of the family. They need them to develop sound educational programs; to compare cost of living of farm families with that of nonfarm families; to appraise the adequacy of family diets, clothing, and other consumption; and to measure the effect on these of various policies and programs, especially those relating to the utilization of farm products. Periodic information about incomes, savings, expenditures, and other measures of consumption show the adjustments families make to economic change. They also are useful in constructing basic budgets for comparing the cost of living of various groups; for developing material that will assist families with problems of management of money, time, and other family resources; and in analyzing market demand for food, clothing, and other goods.

Several small studies of rural family living are now under way by the Bureau. Some will soon be completed. One, in cooperation with the University of Tennessee, was designed to show adjustments to economic change made by farm families as compared with those made by nonfarm families. Another, in cooperation with the Mississippi Agricultural Experiment Station, was designed to show the changes in living that occur as rural industries afford opportunities to supplement income from farming enterprises. Other studies in progress will show, on a regional basis, how farm families were living in 1945 and 1946 as compared with how they lived in 1941 and 1935-36. These studies will reveal many facts and relationships useful to teachers, producers, and public leaders.

Analysis of data from regional groups shows that differences in spending between the North and the South narrowed during wartime. Expenditures for family living were higher in 1945 than in 1941 among farm families both in the North Central States and in the South, according to preliminary figures from a Bureau study done in cooperation with the Bureau of Agricultural Economics. In part the higher figures for 1945 reflect the rise in prices, but expenditures for farm family living went up faster than prices paid as measured by the Bureau of Agricultural Economics index. Furthermore, there were indications that larger quantities of farm-furnished meat and some other foods were used. Apparently in many respects farm families were living better in 1945 than in 1941. Although for each year figures were higher in the North than in the South, the percentage difference between the two regions was considerably less in 1945 than in 1941.

The rate of change in per capita spending (apart from that for housing and automobile, omitted because incompletely reported) appeared to be almost identical from 1936 to 1945 for farm families in four North Central States and for all consumers. The conclusion that farm and other families make similar adjustments to economic change is based on a Bureau analysis of data from farm family accounts summarized by State colleges in Kansas, Illinois, Iowa, and Minnesota, and of figures reported on a national basis by the Department of Commerce.

But the number of dollars at the disposal of farm and nonfarm groups differs widely. For example, average money incomes of Tennessee white farm families in 1944 was \$1,203, whereas incomes of non-farm white families in one county (Blount) averaged \$2,535, according to a Bureau study in cooperation with the University of Tennessee. Out of the smaller income the farm families saved fewer dollars than nonfarm families, an average of \$329 as compared with \$473. Their savings, however, represented a larger proportion of income—27 percent as compared with 19 percent. The "break-even point" of the farm families was \$638, and of the rural nonfarm families, \$1,299. By "break-even point" is meant the money income at which families on the average do not save, but are able to meet living expenses without drawing on savings or going into debt.

Farm families live on less money than nonfarm partly because of the food and fuel that are farm-furnished—and cash outlays for these are included largely with farm expenses—and because housing comes with the farm. In addition certain family expenses are joint with the farm, a fact which tends to lower the cost of a given amount of service to the family, e. g., travel costs per mile in the family car. Hence it is useful for some purposes to compare farm and nonfarm groups with respect to spending patterns for goods and services other than items that largely come from the farm or have joint costs.

Tennessee white farm families and white rural nonfarm families in the one county used \$428 and \$762, respectively, in 1944, for these other expenses. The farm families spent 41 percent of this money for clothing and 23 percent for personal and medical care, as compared with nonfarm expenditures of 36 and 20 percent, respectively. But the dollar expenditures for these items by farm families amounted to only \$176 and \$97 in contrast to \$274 and \$156 spent by their non-farm neighbors. The relative importance of expenditures for various types of goods and services is not very different for these farm and nonfarm families. However, the larger expenditures of nonfarm families indicate that their consumption level was much higher.

Many more facts and analyses will be forthcoming from the studies in progress. These and others are needed for an understanding of how people are living and what can be done toward improving rural home and community life.

#### REPORTING RESEARCH FINDINGS

From the time research in human nutrition and allied subjects was inaugurated in the Department of Agriculture over 50 years ago, reporting the findings to the public has been considered an essential part of the job. Each year a larger proportion of the Nation's home-

makers seek such scientific help. Each year more professional, governmental, and trade groups ask to receive results as rapidly as a piece of research is completed. In consequence, the job of reporting the research findings involves preparation of more and more materials suited to the specialized needs of different groups.

During the year July 1, 1946, to June 30, 1947, the Bureau issued 33 printed and processed publications; 24 technical articles for professional journals; 109 popular articles, press releases, and fact sheets; 11 radio scripts and broadcasts. An additional 4 publications, 7 technical articles, and 7 popular articles are in press.

Distribution for the 118 popular and technical bulletins currently in circulation totaled well over  $5\frac{1}{4}$  million copies for the fiscal year. Many requests, however, could not be fully met or had to be refused altogether because shortage of printing funds curtailed the supply of publications.

As visual aids to group leaders and teachers in presenting basic facts about the relation of certain nutrients to body growth and vigor, the series of 10 nutrition charts issued some years ago was completely revised and placed on sale through the Superintendent of Documents. In the light of postwar conditions, the "Basic Seven" chart showing the food groups essential in a well-balanced diet was likewise revised and made available as another teaching tool. Many commercial as well as educational groups are reproducing the "Basic Seven" in their materials, thus greatly aiding the Government's efforts in bringing the plan for a well-balanced diet to public attention.

A loan exhibit of mounted photographs with descriptive notes entitled "Is Research Your Job?" has been sent on request to 30 student conferences. This series of photographs designed to interest students in training for research shows some of the younger members of the Bureau staff at work in typical jobs. Conference leaders report that this is proving to be useful vocational-guidance material to undergraduate and graduate college students, and reservations for the exhibit are made long in advance.

